



ESR4: Sofia Cella (CERN and University of Geneva)

Mid-Term Check Meeting
January 9th, 2023



We acknowledge funding from the European Union Horizon 2020 research and innovation programme, call H2020-MSCA-ITN-2020, under Grant Agreement n. 956086

Background information

About me:

- Sofia Cella
- Born on 28/04/1997
- From Gallarate (near Milan), Italy



PhD Position ESR4:

- Beneficiary: CERN
- PhD from the University of Geneva
- Start date: 01/09/2022

Academic background:

BS and MS in Physics at the University of Milan:

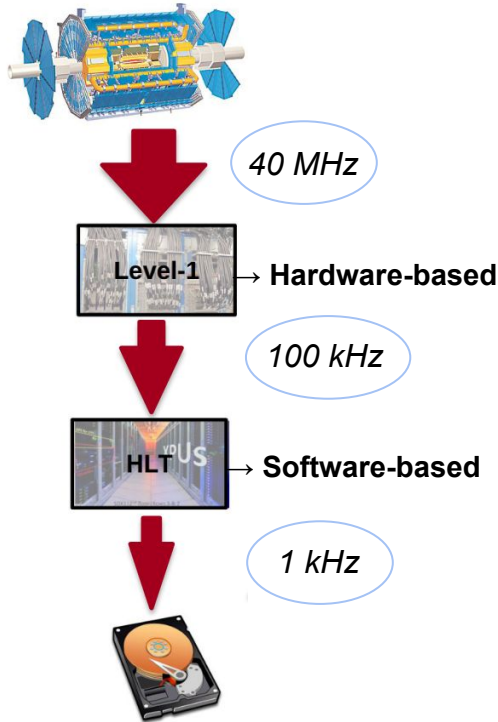
- Bachelor's on 10/12/2019
- Master's on 08/04/2022

Member of the ATLAS experiment since March 2021,
joined for Master's Thesis project:

Measurement of inclusive isolated-photon cross section with the ATLAS detector using the Frixione isolation prescription



ATLAS Trigger System:



- Currently working on the ATLAS high-level-trigger (HLT)
- From next year: physics analysis with the CERN and UniGe group

The ATLAS Trigger System is a RTA system for selecting the most interesting collisions

Some concepts about the **high-level-trigger (HLT)**

- The event selection is constituted of sequences of selection steps, called *chains*
- Each step is constituted of selection algorithms
- Collection of all the trigger chains: *trigger menu*
- Chains with too high rate need to be *prescaled*
- Chain with prescale n : $1/n$ probability of activating when seeded

HLT Rates and Cost analysis

- *Cost analysis* allows to monitor the CPU cost of algorithms and chains execution
→ estimation of the required resources in advance of collisions
- *Rates analysis* allows to predict the trigger menu rates in advance of collisions
→ calculation of the prescale sets
- So far, I've worked on the improvement of the existing HLT performance monitoring tools
- Next steps:
 - use also external performance tools (profilers) for cost monitoring
 - optimize existing algorithms or try new ones (e.g. ML) → ML for efficient deployment on trigger

Improvements to the *Trigger Menu Rulebook*

- The Rulebook is the package used to create prescale sets
- Work on the Rulebook + part of the work on Rates and Cost: *ATLAS authorship qualification task*

Trigger Operation

Contribute to the data-taking during the LHC Run 3

- Shifts in the ATLAS Control Room:
 - Trigger desk: provide trigger configuration, monitor trigger rates
 - Run control desk: start and stop the runs, change system configuration
- Trigger Offline Reprocessing Expert:
 - Validation of software releases re-running trigger algorithms

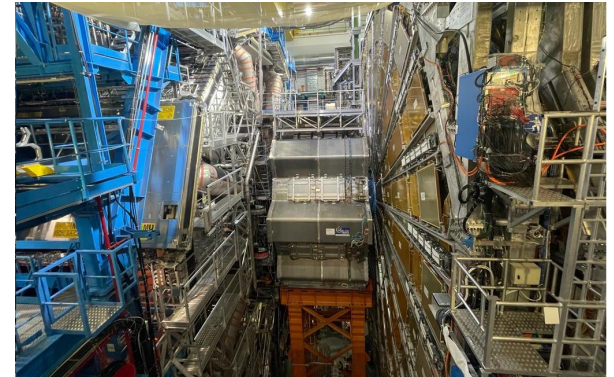
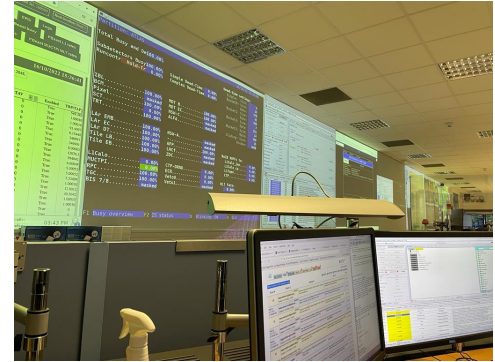


Other activities

- October: training as ATLAS Control Room shifter and Trigger Reprocessing expert
- Outreach - December: training as ATLAS Underground guide
- French course at CERN (B1/B2)

Planned for 2023:

- Secondment at Lightbox (Geneva):
 - *ML for time series analysis in finance*



Career expectations

Continuing my research career in the ATLAS Collaboration → Postdoc

- ATLAS Trigger: work on the HLT Software + Trigger Operation
- Physics analysis: Standard Model or beyond!

